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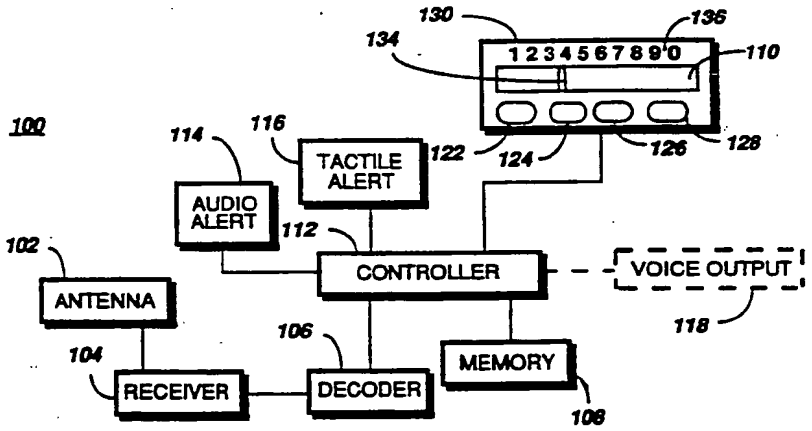
(54) Title: SELECTIVE CALL RECEIVER WITH SECURED MESSAGE PRESENTATION



(57) Abstract

A selective call receiver (100) comprises a memory (108) that stores received messages. The selective call receiver (100) further accepts a password that is compared to a stored password and when substantially similar activates a display (110) or voice output (118) that presents the message.

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SELECTIVE CALL RECEIVER WITH SECURED MESSAGE PRESENTATION

Field of the Invention

This invention relates in general to a message security system, and more specifically to a selective call receiver with a password secured message presentation.

Background of the Invention

With the proliferation of selective call receiver (e.g., paging) technology, there is an increasing demand for selective call receivers capable of protecting received messages. Although selective call receivers are normally personal communication devices that are usually worn on the person, there are other times when selective call receivers (and the information they contain) may be accessed by unauthorized persons (e.g., when selective call receivers are being charged, when left on a desk, theft, etc.). However remote this unauthorized access may be, valuable private information may be compromised. In a highly competitive market where the success or survival of businesses and individuals may depend upon a scrap of timely information, it is extremely important that the selective call receivers used by employee and management do not compromise private communications. Numerours display selective call receivers often contain information that are highly proprietary to their users. Examples of such information are financial data of companies, medical problems of patients, or personal information, such as credit card numbers, bank account numbers, telephone numbers and/or addresses. Currently, some selective call receivers are equipped with a lock feature, however, this feature only protects the locked-messages or users. As a result, proprietary information in currently available selective call receivers is unprotected, and vulnerable to unauthorized persons in numerous instances, such as when selective call receivers are lost or stolen, etc.

Accordingly, a need exists for a secured message selective call receiver.

Summary of the Invention

Briefly, according to the invention, a selective call receiver comprises a memory that stores received messages. The selective call receiver further accepts a password code that is compared to a stored password, and when substantially similar, activates an output device that presents the received message(s).

Brief Description of the Drawings

FIG. 1 is a block diagram of a selective call receiver in accordance with the present invention.

FIG. 2 is a flow chart of selective call receiver operation in accordance with the present invention.

FIG. 3 is a block diagram of a selective call receiver in accordance with a second embodiment of the present invention.

FIGs. 4A and 4B are a flow diagram illustrating the operation of the selective call receiver according to FIG. 3.

Description of a Preferred Embodiment

Referring to FIG. 1, a selective call radio receiver 100 (e.g., a pager) comprises an antenna 102 that provides an RF carrier signal that is mixed with a local oscillator signal contained within a receiver module 104. The receiver module 104 generates a recovered signal suitable for processing by a decoder 106 in a manner well known to those skilled in the art. The decoder 106 converts the signal to an address. A controller 112 compares the decoded address with one or more predetermined addresses contained in a memory 108. When the addresses are substantially similar, the user is alerted that a signal (message) has been received either by an audio alert (e.g., speaker) 114 or a tactile alert (e.g., vibrator) 116. The received signal may also include optional message data directed to some selective call receivers. Also, if the selective call receiver includes an optional voice output 118, recovered audio components of the received R.F. signal may be presented. For a message or a voice selective call receiver, the recovered message or voice

output is stored in a memory 108 for subsequent "playback" by an optional voice output 118. The display 110 will automatically, or when manually selected by controls 122,124,126,128, present the message, such as by displaying the message on a display 110.

According to the invention, the controller 112 will secure all address associated received messages in memory 108, thus disabling the access to the messages stored in the memory 108 until the user enters the required password. Operationally, the control/entry block 130 includes a pointer 134 that can be scrolled in either direction by activating a shift key 128 while simultaneously or sequentially activating a position/read key 122. Aligning the pointer 134 with the appropriate number on a label 136 and activating the shift key 128 while simultaneously activating a enter/lock key 124 will preferably cause the first number of a password code to be entered. Repeating this operation will permit the rest of the password to be entered. The preferred number of entry is chosen to be four for convenience and efficiency. It can be appreciated that the chosen number of entry can vary significantly depending on the memory and other pertinent features of the system. Subsequent to a successful entry of the correct password, the message stored in the memory 108 will be displayed on the display 110 or replayed on the optional voice output 118. Conventional techniques of scrolling may be used to access different received messages. In this way, received messages may not be accessed until the appropriate password is verified by the selective call receiver 100. This also provides a further advantage, in that, if the unit is stolen, it would be useless after its misappropriation.

During the reading/listening of the message, important messages may be optionally held in memory 108 by pressing the entry/lock key 124 while the desired message is on the display 110 or being presented by the voice output 118. Alternately, messages may be discarded by similar operations, but instead, activating the shift key 128 while pressing the delete/volume key 126. It can be appreciated that the password may be entered by any of the available conventional techniques. Additionally, a delete/volume key 126 can be used to vary the volume of either a voice message or the volume of a voice recognition system, if used as the password entry system. It can be further appreciated that the password secured message display can be activated by several different method (e.g., once the password is entered the system

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remains opens, remains for a maximum of 24 hours, opens on a hourly basis, opens on a per message basis, or may be open only after a paging event has been received etc.).

Depending on consumer needs, the password secured message presentation may be customized to meet one of the several available security option. Furthermore, the password secured message presentation can be designed that when an unread message or a stored message is in memory, the selective call receiver 100 may not be turned off until the password is entered. In this way, a selective call receiver user can obtain message security, and also has the option of preventing accidental message loss by a user inadvertently turning off the power of the selective call receiver 100.

The operation of the present invention is shown in the flow chart of FIG. 2. According to the invention, when the selective call receiver 100 receives a page, step 202, with an address substantially similar, the page is stored in memory, step 204. Subsequent to the receipt of the page, the user is alerted of the receipt of a page, step 206, by one of the several conventional means of alerting used by a typical selective call receiver. In step 208, the selective call receiver 100 checks to verify if the password secured message presentation option is currently enabled. If the password secured message presentation is disabled, the received message is enabled and readily displayed or heard at the users request, step 212. Alternately, if the password secured message presentation is enabled, the access to the message is disabled until the appropriate password is entered, step 210, and verified, step 214. For convenience and security, the preferred number of characters (numbers) used are four. After the password (ID) is entered (i.e., four character sequence) and verified to be correct, step 214, the message is enabled and displayed to the user, step 212. However, if the password is determined to be incorrect, step 214, the number of attempts are accumulated, step 216, and in step 218, the number of attempts are checked. If there are three attempts, the password entry mode is disabled, step 220, by any conventional techniques. However, if there are less than three attempts, another opportunity is given to reenter the correct password, step 210. In this way, the selective call receiver can secure a received message in memory 108 until a user enters the correct sequence of numbers. According to the invention, the password in not verified until a

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complete sequence is entered, thus withholding from the user the additional knowledge of which particular number or numbers that are incorrect.

In summary, the invention comprises a selective call receiver including a memory that stores a received message. The selective call receiver further accepts a password that is compared to a stored password and when substantially similar activates a display or a voice output device that presents the message to the user.

Thus, the present invention provides a selective call receiver with a password or ID protected message that may only be retrieved from memory when the user enters the correct sequence. With this invention, private message(s) residing in a selective call receiver's memory may not be probed by intrusive persons. Furthermore, in the unfortunate instances when a user's selective call receiver is misappropriated, the selective call receiver's message may not be assessed from memory, thus rendering the selective call receiver useless.

Referring to FIG. 3, a second embodiment of the invention is shown. The preferred operation of this embodiment of the selective call receiver is substantially similar to the first embodiment disclosed in FIG. 1, with exceptions to a display 330 and the operations associated with protecting, receiving, storing, and retrieving messages. The preferred display 330 is illustrated with a display screen 334 for displaying a menu having a plurality of icons preferably located at the bottom of the display screen 334. A function key (or button) 324 is used to select different options or functions by selecting different icons. In selecting different icons, a directional key pad 326 having four directional keys is shown for moving a cursor (not shown) from one icon to the next. An icon, for example, may represent a particular message stored in memory. Stored messages are preferably accessed and displayed on the screen 334 by depressing the read button 322 when the cursor is pointing to the desired message icon. The preferred method of identifying a selected icon is by continually turning the icon on and off (i.e., blinking) when the cursor in moved above or pointing to an icon. However, it should be appreciated that other conventional methods may be used to identify selected icons. Finally, a conventional reset button 336 is shown on the display 330 for resetting the selective call receiver.

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Operationally, upon receipt and storage of at least one message by the selective call receiver, a user may access the stored message by entering a sequence of user predefined keys.

To protect stored messages in this embodiment, a selective call receiver user is required to enter a sequence of key-strokes to access messages stored in memory. The user is required to follow the preferred sequence of depressing a function key 324 to display a menu of functions, the menu of functions is preferably positioned to the right and left of a home directional icon 332. The menu functions includes a plurality of icons displayed on the screen 334. The direction key-pad 326 moves the cursor to a preferred icon, such as a security icon 328, by depressing the appropriate directional keys. Those skilled in the art will appreciate that the security icon 328 may be graphically similar to one of the currently available icon representations. Operationally, by manipulating the appropriate directional keys on the directional key-pad 326, the cursor is moved to the appropriate icon. When the cursor is positioned on the chosen icon, for example the security icon 328, the icon will blink to signify its selection. Thus, activating the function key 324 again enables an entry mode for entering a user selected sequence of keys, preferably, the keys located on the directional key-pad 326. For example, a user may choose to select any combination of keys, such as, depressing the UP-button twice, followed by one push on the DOWN-button, and two pushes on the LEFT-button to enter a key sequence. Of course, the user may select any combination of key-strokes, and the limitation on the number of key-strokes may be only a function of the capabilities of the particular selective call receiver. A final pressing of the function key 324 completes the entry or programming of the message retrieving sequence which is then stored by the selective call receiver. In this way, the stored messages are protected from unauthorized users.

Similarly, a user attempting to retrieve a stored message must follow the above delineated steps. Additionally, it may be desirable for the selective call receiver to prompt the user to enter the security code (i.e., same or substantially similar sequence to the previously entered key sequence) and upon entry of the security code, the user will be allowed to access or retrieve the stored messages. In this way, a user has the capability of entering a keyed sequence which forms a security code to protect or prevent unauthorized

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access to proprietary messages. Furthermore, the user, upon a verified entered security code, can access the stored messages.

To change the security sequence (code), the above steps are preferred, but after entering the current security code, and subsequent to its verification by the selective call receiver, the user is permitted to change his security code. This preferably occurs by selecting the security icon again which prompts the user to enter a new keyed sequence which will become the next security code. Preferably the security code cannot be changed until the user enters the current security code, and subsequent to its verification by the selective call receiver. In this way, a user has the capability of customizing his keyed sequence which forms a security code to protect or prevent unauthorized access to proprietary messages. Furthermore, the user may change his security code as frequently as is necessary to maintain a high level of message protection which furthers the prevention of unauthorized accesses to proprietary information.

FIGs. 4A and 4B are a flow diagram illustrating the operation of the selective call receiver according to the invention. The power-up sequence is executed when the selective call receiver is "turned-on" (step 402). Upon completion of the power-up sequence, the selective call receiver goes into a stand-by-mode (step 404). In this mode, the selective call receiver awaits a user entry or response by continually checking if the function key is activated (step 406). The process remains in the stand-by-mode until a key is activated. Upon activation of a key, the operation moves to step 408, which displays a menu of icons. Subsequent to displaying the icons, a timer is initialized (step 410), and step 412 determines if a security icon has been selected. If so, step 414 determines if a program bit is "set" (initialized). The program bit is initialized only when a security code (i.e., the key sequence) has been programmed (or stored) within the selective call receiver. In this way, a new selective call receiver, after the user has selected the function key, will offer the user the option to enter a sequence of keys to form a security code for protecting received messages.

For a new selective call receiver, the program bit would not be initialized because the selective call receiver would not have a security code stored in memory. Initialized, as used in this case, refers to a digital one or zero or any other appropriate value depending on the designer's preference.

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According to the flow diagram, if the program is not initialized, the selective call receiver reads the key inputs (step 416). Step 418 decrements the timer, and step 420 determines if the timer is zero. If zero, the flow transfers to the stand-by-mode (step 404). Alternatively, if the timer is not zero, step 422 determines if the function key is activated. An activated function key signifies that the user has completed the entry of the key sequence. If the function key is not activated, the process transfers to step 416 that reads the key inputs again. The process repeats itself until the timer reaches zero (step 420) or the function key is activated (step 422). Thus, if the function key is activated, the key inputs are stored in memory (or a code plug) to form the security code. After the security code is stored, the program bit is complemented (initialized), step 426. The program bit ensures that the selective call receiver will not attempt to store another security codes unless the user deliberately selects the change security code. In this way, the user is allowed to enter a key sequence that constitutes a security code for protecting confidential messages.

Additionally, the selective call receiver determines if other icons are selected (step 450), and if yes, the corresponding operation is performed (step 452). Upon completion of this operation, the selective call receiver returns to the stand-by-mode (step 404). Conversely, if no other icons are selected, the timer is decremented (step 454) and step 456 checks if the timer is zero, and if zero, the process again continues to the stand-by-mode (step 404). Alternatively, if the timer is not zero, the control transfers to step 450 where the sequence of steps are repeated as mentioned above until the timer reaches zero, or until an icon is selected (step 450). Thus, when the security icon is selected (step 412),the flow transfers to step 414 where the program bit is checked. As previously discussed, an initialized program bit determines if the selective call receiver has an already stored security code.

Continuing at step 414, if the program bit is initialized, the selective call receiver further checks if the security icon is again selected (step 428). In step 428, the user may change the security code by selecting the security icon a second time, after the verified entry of the current security code. Thus, when the security code is reselected, the process transfers to step 416. The remaining steps are described above which is similar to the steps of the initial security code entry.

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However, if the user chooses not to change the security code, the function key is checked to determine if it was activated (430). An activated function key signifies that the user has completed the entry of the security code. The switch inputs are read (step 432) and checked to determine if the correct sequence was entered (step 434). Upon verification, if the entry is incorrect, the timer is decremented (step 436) and then the timer is checked for a zero value (step 438). If no, the flow returns to step 432 to read another set of switch inputs (key sequences). In this fashion, the user is allowed a limited opportunity to reenter his key sequence after an incorrectly entered sequence. However, a zero value on the timer (step 438) disables the entry mode which signifies that the opportunity to reenter another security code has expired. Conversely, if at step 434 the key sequence was verified to be correct, the screen status is displayed and access is provided to the stored messages (step 440). The user then is allowed to access and read the stored messages by conventional methods (step 442).

In this way, this invention provides a method for entering a user customized security code for preventing unauthorized access of sensitive information. Additionally, periodic changes of security code is provided at the user's option for fostering the continued high security on stored messages. However, before changing the present security code, the user must first enter the present security code, and by selecting the security icon, the user is allowed to re-enter a new sequence of keys to be stored as a new security code.

Thus, what is claimed is:

CLAIMS

1. A selective call receiver comprising:
a receiver for receiving at least an address signal;
a memory for storing a received message;
entry means for entering a password; and
processor for comparing the password with a stored password for enabling presentation of the message.

2. The selective call receiver according to claim 1 wherein the processor enables a display when the received password is substantially similar to the stored password.

3. The selective call receiver according to claim 1 wherein the processor may be programmed to selectively enable the message presentation for different lengths of time.

4. The selective call receiver according to claim 1 wherein the processor enables a voice output when the received password is substantially similar to the stored password.

5. A selective call receiver comprising the steps of:
(a) receiving a message;
(b) storing the received message;
(c) receiving a predetermined password;
(d) displaying the message when the received password corresponds to a stored password.

6. The selective call receiver according to claim 5 wherein step (c) may precede step (a).

7. The selective call receiver according to claim 5 wherein step (c) includes comparing the received password to a password stored in memory, and when substantially similar activates a display.

8. A selective call receiver comprising:

a receiver for receiving messages;

a memory for storing received messages;

accessing means, coupled to the memory, for accessing stored messages, the accessing means comprising:

entry means for entering a plurality of key-strokes by the operation of at least two keys;

selecting means for selecting a security mode for enabling the entry means; and

means for comparing the plurality of entered key-strokes with a stored sequence for enabling presentation of a stored message.

9. The selective call receiver according to claim 8 wherein the accessing means includes a disabling means for disabling the entry means.

10. The selective call receiver according to claim 8 wherein the accessing means comprises means for enabling a display when the entered plurality of key-strokes are substantially similar to the stored sequence.

11. The selective call receiver according to claim 9 wherein the disabling means comprises means for disabling the accessing means in response to when at least one of the entered plurality of key-strokes is different from the stored sequence.

12. The selective call receiver according to claim 11 wherein the disabling means comprises a timer for deactivating inputs to the accessing means after a predetermined time has passed.

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13. A method for protecting messages in a selective call receiver, comprising the steps of:

(a) receiving a message;

(b) storing the received message;

(c) selecting an entry mode by a user;

(d) receiving a plurality of key-stokes from at least two keys;

(e) displaying the message when the plurality of key-strokes is substantially similar to a stored sequence.

14. The method for protecting messages according to claim 13 wherein steps (c) and (d) precede step (a).

15. The method for protecting messages according to claim 13 wherein step (d) includes the steps of comparing the entered sequence of key-strokes to the stored sequence in memory.

16. The method for protecting messages according to claim 13 wherein step (d) disables step (c) after expiration of a time interval.

17. The method for protecting messages according to claim 13 wherein the steps of entering a plurality of key-strokes includes selectively pressing at least two directional keys.

18. A selective call receiver comprising:

a receiver for receiving messages;

a memory for storing received messages; and

display means, coupled to the memory, for displaying stored messages comprising:

entry means for entering a plurality of key-strokes via at least two-directional keys;

an icon for selecting a security mode for enabling the entry means;

means for comparing the plurality of entered key-strokes with a stored sequence for enabling presentation of the message; and

a timer for disabling the entry means after expiration of a time interval.

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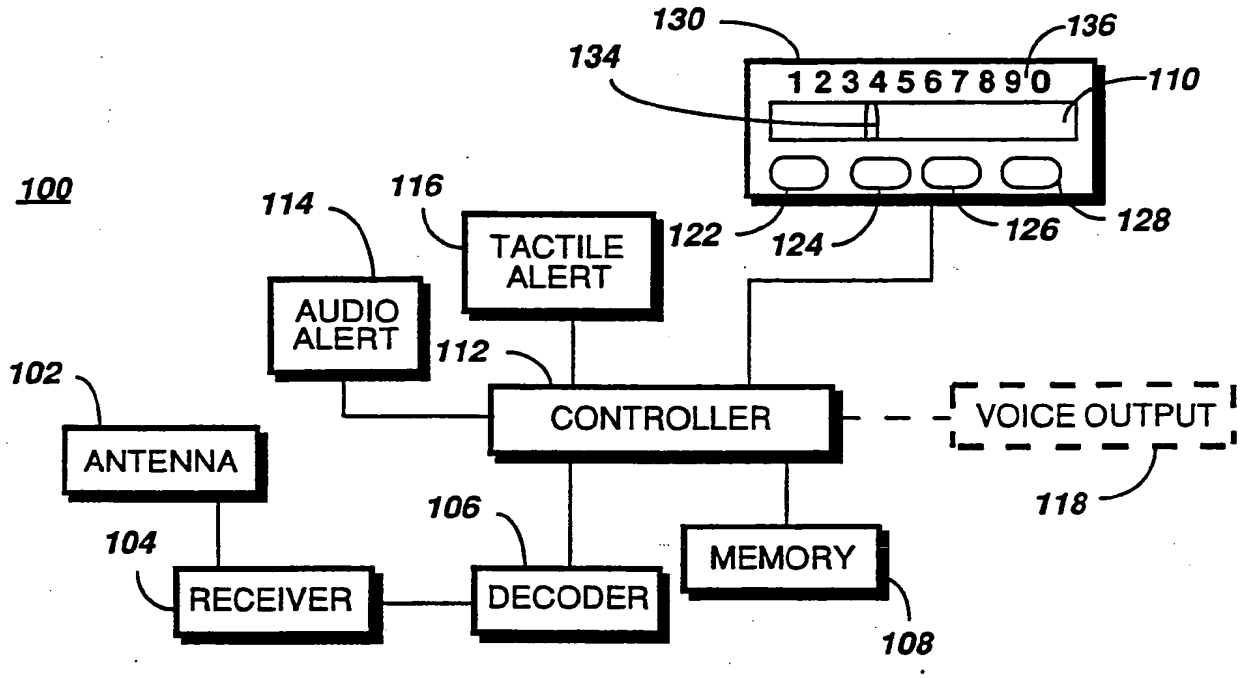

FIG. 1

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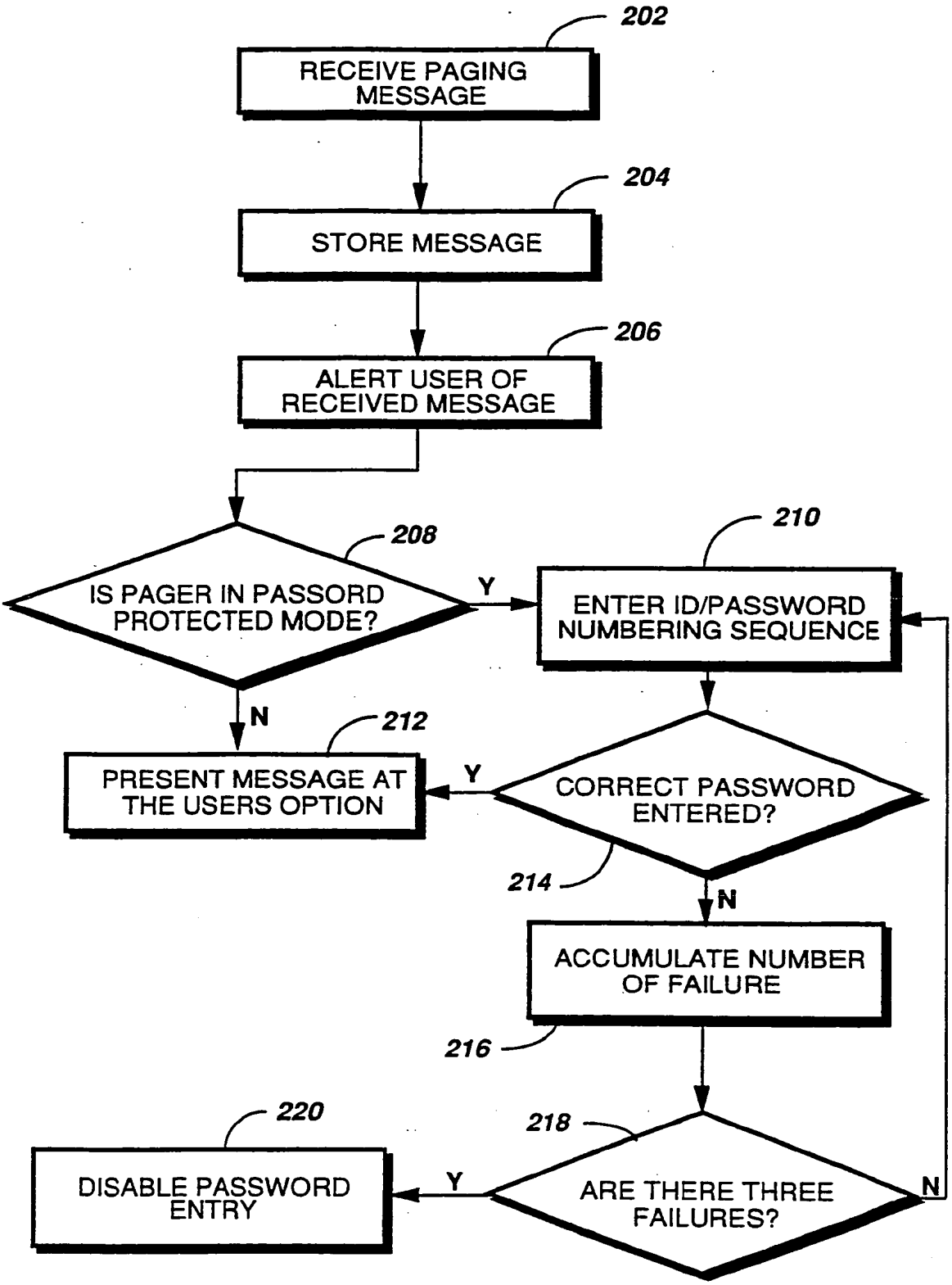

FIG. 2

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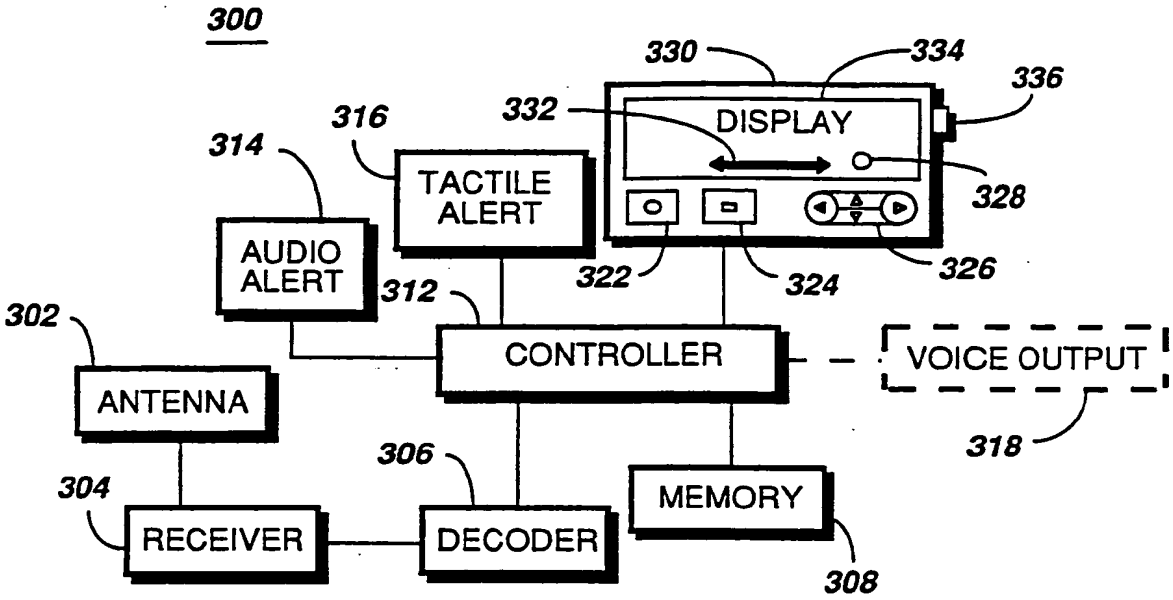

FIG. 3

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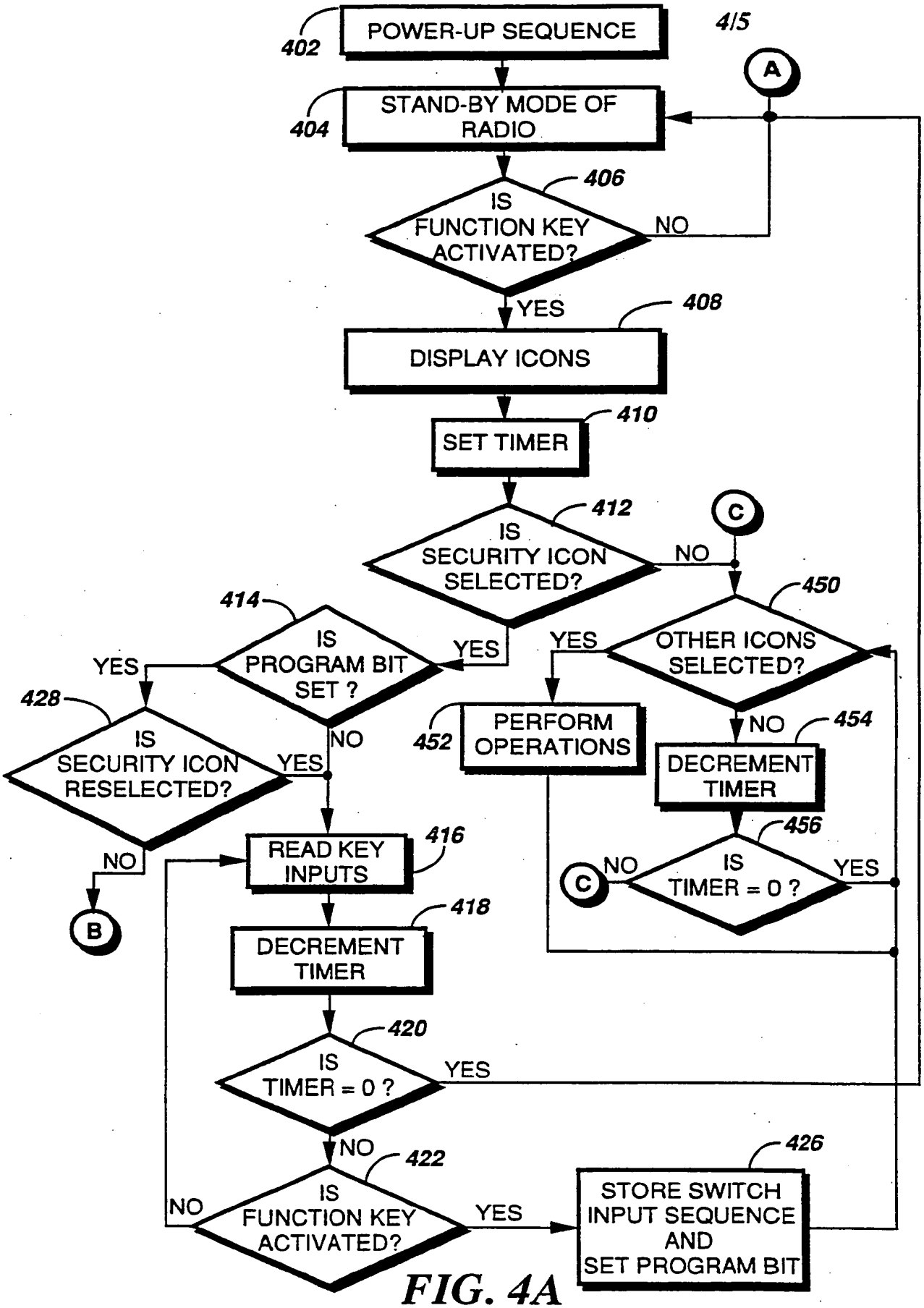

FIG. 4A

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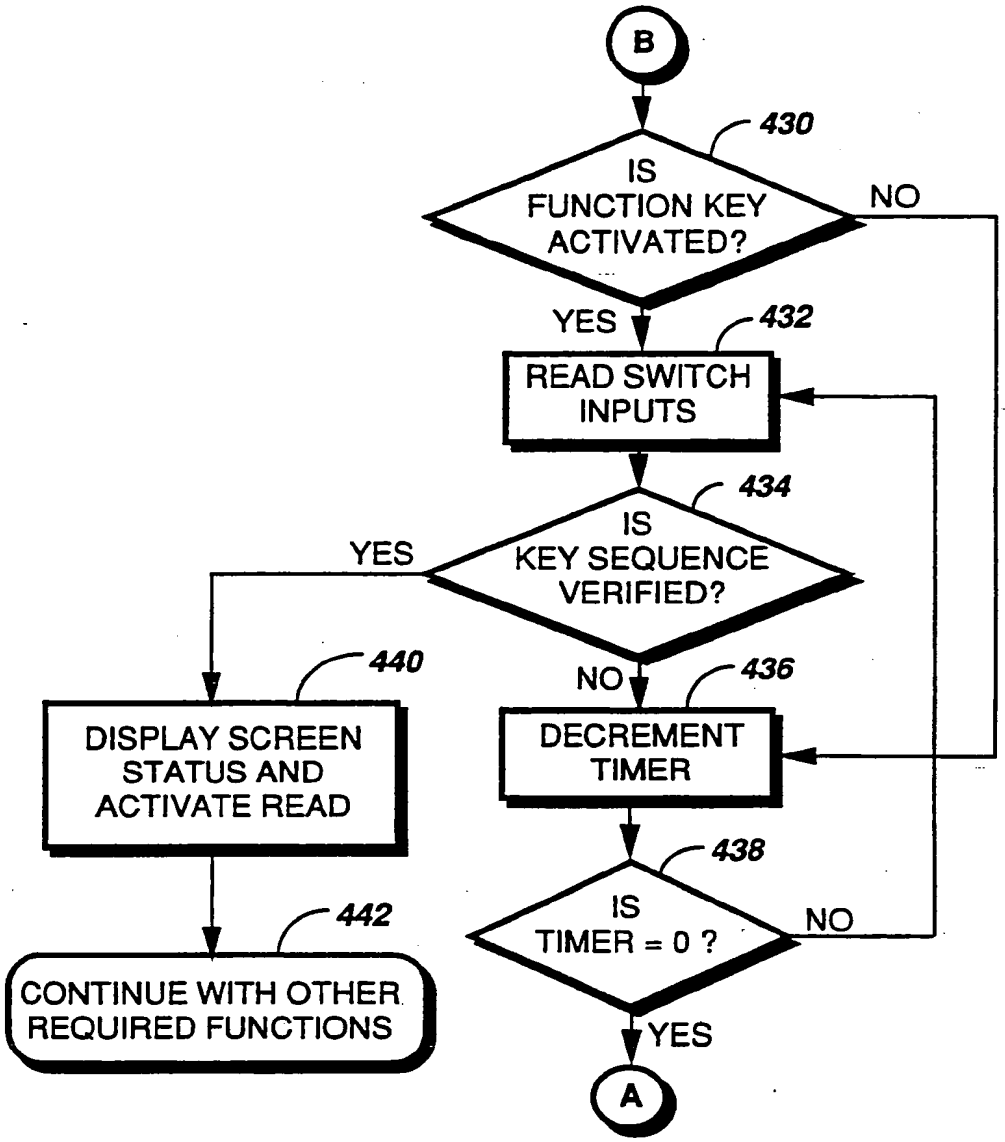

FIG. 4B

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INTERNATIONAL SEARCH REPORT

International Application No. PCT/US91/05137

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC (5): H04B 7/26
U.S.Cl.: 340/825.440

II FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
U.S.Cl.	340/825;300,825,340,825,260,825,270,825,440,825,470, 825,480,825,450; 198/950

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X / Y	JP, A, 1-39130 (AOKI) 09 February 1989 (Note entire document)	1-2,5,7-11 / 3-4,6, 12-18
X / Y	GB, A, 2,222,287 (YAMOSAKI) 28 February 1990 (Note entire document)	5-7 / 1-4, 8-18
Y	US, A, 4,644,347 (LUCAS ET AL.) 17 February 1987 (Note Fig. 2A; col. 3, lines 28-31; col. 5, lines 15-34).	4
Y	US, A, 4,117,542 (KLAUSNER ET AL.) 26 September 1978 (Note col. 15, lines 28-42; col. 18, lines 45-70; abstract).	6,8-11,13-15
Y	US, A, 4,843,385 (BORRAS) 27 June 1989 (Note col. 13, lines 10-20; col. 14, lines 30-40; col. 16, lines 7-10).	6,8-11,13-15 18
Y	US, A, 4,839,641 (MORI ET AL.) 13 June 1989 (Note Fig. 11; col. 17, lines 4-18).	17, 18
Y	US, A, 4,839,640 (OZER ET AL.) 13 June 1989 (Note col. 31, lines 28-37).	12, 16

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
05 March 1992	08 APR 1992
International Searching Authority	**Signature of Authorized Officer**
ISA/US	Jim Giust

Form PCT/ISA/210 (second sheet) (Rev.11-87)

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FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A	JP, A, 60-189577 (URAMOTO) 27 September 1985 (Note abstract).	1-18

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ..... . because they relate to subject matter [1] not required to be searched by this Authority, namely:

2. ☐ Claim numbers_____, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out [1], specifically:

3. ☐ Claim numbers_____, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

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